WE CLAIM:

1. A carrier comprising a matrix of inorganic, organic or organic and inorganic material and containing a biomolecular interaction entrapped within the matrix, wherein the biomolecular interaction comprises two entities that can be reversibly dissociated from the other.

2. The carrier of claim 1 wherein the entities of the biomolecular interaction can under denaturing conditions be reversibly dissociated within the matrix and wherein the matrix in the denaturing conditions inhibits aggregation of the entities.

3. The carrier of claim 2 wherein the pore size of the carrier is selected as to inhibit leaching out of the biomolecular interaction or entities thereof.

4. The carrier of claim 3 wherein pore size of the carrier is selected to enable potential modulators of the biomolecular interaction to pass in and out of the matrix.

5. The carrier according to claim 1 wherein the carrier comprises a silica based glass.

6. The carrier according to any one of claims 1 to 5 wherein the material is a silicon, titanium, vanadium or cerium-based metal alkoxide, alkylated metal alkoxide or otherwise functionalized metal alkoxide or a corresponding metal chloride, silazane, polyglycerylsilicate or other silicate precursor.

7. The carrier according to any one of claims 1-5 derived by a sol-gel processing method.

8. The carrier according to any one of claims 1-6 wherein the bimolecular interaction is bioactive.

9. The carrier according to claim 7 or 8 pre-treated to contain components found in an animal fluid.

10. The carrier according to claim 9 wherein the pre-treatment is by immersion in a solution containing components found in an animal fluid for a period of up to about seven days prior to use.

11. The carrier according to claim 10 wherein the animal fluid is interstitial fluid.

12. The carrier according to any one of claims 7-11 wherein the carrier is synthesized under sterile conditions or sterilized subsequent to synthesis using conventional sterilization methods.

13. A method for preparing a carrier having a biomolecular interaction incorporated within the carrier that can be reversibly denatured therein, and wherein the matrix inhibits aggregation of the entities of the denatured biomolecular interaction under denaturing conditions comprising:

(a) reacting a reactant comprising a functionalized metal alkoxide or a corresponding or other silicate precursor with water;

(b) adjusting the pH to a value between 4 and 10 either before or during the addition of an aqueous solution containing a biomolecular interaction to provide a mixture;

(c) casting the mixture;

(d) allowing the mixture to gel and age; and

(e) partially drying the aged gel.

14. The method according to claim 13 wherein the reaction occurs alone or as mixtures of more than one reactant where the reactant is a silicon, titanium, vanadium or cerium-based metal alkoxide, alkylated metal alkoxide or otherwise functionalized metal alkoxide.

ART 34 AMDT

15. The method according to claim 14 wherein the functionalized metal alkoxide is aminopropyl triethoxysilane.

16. The method according to claim 13 wherein the corresponding functionalized metal alkoxide is metal chloride, silazane, or polyglycerylsilicate.

17. The method according to any one of claims 13-16 wherein the reacting occurs in an acidic or basic aqueous medium.

18. The method according to any one of claims 13-17 wherein the reactant and water are in a molar ratio of from about 1:1 to about 20:1 water/reactant.

19. The method according to any one of claims 13-18 wherein the casting of the mixture is in a mold, a column, a microtiter well, a spot on a surface by pin spotting, inkjet deposition or screen printing; or a film on a surface by dipcasting, spin-casting or spraying.

20. The method according to anyone of claims 13-19 wherein the gel and aging is at temperatures from about 0°C up to about 40°C.

21. The method according to anyone of claims 13-20 wherein the partial drying is at temperatures from about 4° to about 40°C.

22. A method for the preparation of a carrier having a bioactive biomolecular interaction incorporated in the carrier that can be reversibly denatured in the carrier under suitable conditions comprising:

(a) incorporating the bioactive biomolecular interaction in the carrier;

(b) hydrolysis and polycondensation of at least one monomer to provide a solid matrix bonding the bioactive biomolecular interaction which is incorporated in the carrier; and

(c) imparting mechanical, chemical and thermal stability in the matrix.

23. The method according to claim 22 wherein the at least one monomer is a functionalized or non-functionalized alkoxysilane; functionalized or non-functionalized bis-silane; functionalized or non-functionalized chlorosilane; sugar, polymer, polyol or amino acid substituted silicate; or additives selected from any available organic polymer, polyelectrolyte, sugar (natural or synthetic) or amino acids (natural and non-natural).

24. The method according to claim 23 wherein the monomer is based on titanium, vanadium or cerium.

25. The method according to anyone of claims 22-24 wherein mechanical, chemical and thermal stability is imparted by combination of precursors and additives.

26. The method according to anyone of claims 22-24 wherein mechanical, chemical and thermal stability is imparted by choice of aging and drying methods.

27. The method according to anyone of claims 22-24 wherein mechanical, chemical and thermal stability is imparted by combination of precursors and additives, and by choice of aging and drying methods.

28. The method according to any one of claims 22-27 wherein the carrier comprises a silica based glass.

29. The method according to any one of claims 22-28 wherein the carrier comprises a silicon, titanium, vanadium or cerium-based metal alkoxide, alkylated metal alkoxide or otherwise functionalized metal alkoxide or a corresponding metal chloride, silazane, polyglycerylsilicate or other silicate precursor.

ART 34 AMDT

30. The method according to any one of claims 22-28 wherein the carrier is derived by a sol-gel processing method.

31. The method according to anyone of claims 22-30 wherein the carrier is a carrier according to claim 8.

32. A method for screening a compound to determine the degree of inhibition or binding of a biomolecular interaction by the compound comprising contacting the compound to be tested with the components of a biomolecular interaction that are incorporated within a carrier and are capable of forming a biomolecular interaction in the carrier, and wherein inhibition of the formation of the biomolecular interaction or binding by the compound causes a change in the amount of a detectable signal produced by the molecules of the interaction of by one or more labels at or near the site of interaction of the molecules.

33. The method according to claim 32 wherein the biomolecular interaction is incorporated within the carrier as in any one of claims 1 to 12.

34. The method according to claim 32 wherein the carrier comprises a silica based glass.

35. The method according to any one of claims 32 or 34 wherein the carrier is prepared from a silicon, titanium, vanadium or cerium-based metal alkoxide, alkylated metal alkoxide or otherwise functionalized metal alkoxide or a corresponding metal chloride, silazane, polyglycerylsilicate or other silicate precursor .

36. The method according to any one of claims 32-35 wherein the carrier is derived by a sol-gel processing method.

37. The method according to anyone of claims 32-36 wherein the biomolecular interaction is bioactive.

38. The method of high through put screening for a substance which inhibits or binds a biomolecular interaction, comprising the steps of:

(a) incorporating a bimolecular interaction within a carrier;

(b) forming an array of sol-gel derived spots on a support wherein each spot contains a biomolecular interaction;

(c) measuring a original signal from the biomolecular interaction in the absence of any other substances;

(d) reversibly disrupting the biomolecular interaction such that the signal is detectably altered;

(e) adding the substance to the bimolecular interaction in the carrier, and reversing the disruption; and

(f) measuring the signal;

where the original signal is not recovered, the substance is determined to bind or inhibit the bimolecular interaction.

39. A method according to claim 38 wherein the signal is excited by a He-Cd laser through an optical fiber or by a nitrogen laser through a bifurcated optical fiber.

40. The method according to claim 39 wherein the signal is detected through the same fiber.

41. The method according to claim 40 wherein the signal is detected in a time-gated or time resolved mode.

42. The method of detecting signals generated by an array according to any one of claims 38-41 wherein the signal is excited by a laser, lamp or light emitting diode, either directly or through an optical fiber, and fluorescence is detected using a CCD camera.

ART 34 AMDT

43. A method of normal or frontal affinity chromatography for pre-screening a substance for binding or inhibiting a bimolecular interaction comprising:

incorporating a biomolecular interaction or individual protein partners within a carrier;

placing said carrier in a column;

adding a denaturant;

passing said substance including an indicator ligand through the column in conjunction with removal of the denaturant; and

determination of retention behaviour by fluorescence or mass spectrometry.

44. The use of the carrier of any one of claims 1 to 12 to conduct the method of any one of claims 32 – 43.